

City University of New York (CUNY)

CUNY Academic Works

Dissertations, Theses, and Capstone Projects

CUNY Graduate Center

9-2020

Visualizing TEDx Events: Ten Years of “Ideas Worth Spreading”

Antonios Liamis

The Graduate Center, City University of New York

[How does access to this work benefit you? Let us know!](#)

More information about this work at: https://academicworks.cuny.edu/gc_etds/4093

Discover additional works at: <https://academicworks.cuny.edu>

This work is made publicly available by the City University of New York (CUNY).

Contact: AcademicWorks@cuny.edu

VISUALIZING TEDx EVENTS: TEN YEARS OF “IDEAS
WORTH SPREADING”

by

ANTONIOS LIAMIS

A master’s capstone project submitted to the Graduate Faculty in Digital Humanities in partial fulfillment of the requirements for the degree of Master of Arts, the City University of New York

2020

© 2020

ANTONIOS LIAMIS

All Rights Reserved

TEDx Events: Ten Years of “Ideas Worth Spreading”

by

Antonios Liamis

This manuscript has been read and accepted for the Graduate Faculty in Digital Humanities in satisfaction of the capstone project requirement for the degree of Master of Arts.

Date

Lev Manovich

Capstone Project Advisor

Date

Matthew K. Gold

Executive Officer

ABSTRACT

TEDx Events: Ten Years of “Ideas Worth Spreading”

by

Antonios Liamis

Advisor: Lev Manovich

I have always been fascinated by how ideas are spread. Often, ideas are chosen to serve an immediate purpose, and there is an expectation that the choice will matter only insofar as it serves to achieve the desired goal. However, once an idea takes off, it becomes sufficient in itself to disseminate its message. When I first heard about the rubric “Ideas Worth Spreading” in connection with Technology, Entertainment, and Design (TED) conferences, I had an emotional response because I was always trying to get involved in those three categories. My fascination with the question of what makes some ideas attractive to a wide range of people motivated me to investigate the world of TED and particularly local TEDx events.

The goal of this project is to visualize, measure, and analyze the growth and dispersal of selected aspects of TEDx events between 2008 and 2019. A TEDx event is a local gathering where live TED-style talks and performances are shared with the community. TEDx events are fully planned, unique, and independently coordinated; but all of them have features in common. Their diverse topics reference multiple issues from a variety of disciplines. Just like TED events, TEDx events lack any religious, commercial, or political content and do not focus solely on entrepreneurship, technology, or business, although their main topics come from those categories.

The project was inspired by a huge data-analysis initiative pioneered by Cultural Analytics Lab called Elsewhere, which maintains numerous datasets of contemporary global cultural activities that were collected and measured by various practitioners (Manovich, 2018).

TED Conferences LLC, a nonprofit company dedicated to hosting short (around eighteen-minute) talks, began by organizing conferences that focused mostly on technology, entertainment, and design. As TED grew, its range of topics expanded to encompass innovation, science, business, global issues, the arts, and more, bringing together audiences and speakers from every walk of life and cultural origin who seek a deeper understanding of contemporary culture.

Between 2009 (the year TED was founded) and 2018, TEDx events were as diverse as the cities that hosted them. They came to form a rich catalog of contemporary cultural trends whose analysis can inform a wide variety of queries about the world we live in. Drawn to the wealth of data that surfaces in an examination of archived and live TEDx events, I began wading through their affordances, looking for patterns and visualizing similarities and differences in TEDx variables specific to different cities from 2009 to 2018. Approaching these variables through data visualization allowed me not only to trace relationships between articulation of ideas and their reception but also to represent the interconnections of these relationships in a graphical interface. The visualizations I created thus explore how the phenomenon of TEDx events bring together thousands of thinkers to share their experiences and opinions about the themes, factor that shape our world today and sometimes pointing to the world of tomorrow.

ACKNOWLEDGMENTS

I would like to express my gratitude to all those whose guidance and support helped me shape this project. First, I am deeply grateful to my Capstone advisor, Dr. Lev Manovich, who inspired me, encouraged me, and helped me develop and focus my ideas. His broad experience and dynamic personality introduced me to the world of contemporary culture using computational methods. More specifically, Dr. Manovich helped me discover a large dataset of contemporary culture that motivated me to explore the world of TEDx events, and I am honored to be considered as a potential contributor to his great project called Elsewhere. I would like to thank Dr. Matthew K. Gold and Jason Nielsen for supporting me and for giving me so many opportunities to learn, travel, and be involved in workshops, conferences and events during the last two academic years.

This project would have been impossible without the help of my loving wife, Maria Kritharioti, who provided me with the opportunity to complete my master's degree in New York. Most importantly, I am thankful for her tremendous patience and support during the long nights of studying and for taking over much of my share of demanding parenting obligations. Trying to earn a degree in digital humanities while being the parent of two kids would have been more difficult without her generosity. I would also like to thank my children for offering me positive energy and moments of laughter during the times when I felt discouraged and stressed.

I extend my sincere thanks to my fellow student and now good friend, Jennifer Cheng, for her continuous support throughout our studies. I could not have succeeded without her tireless guidance and wise advice on all the challenges I faced throughout my academic education at the Graduate Center, CUNY.

In addition, I am thankful to the Graduate Center staff and faculty for providing me with the resources and technical equipment I needed during my studies and for providing valuable lessons

in so many fields. I was given the tremendous opportunity to work as a student employee, which allowed me to take advantage of extra time and gave me the ability to use the all the academic resources provided.

Finally, I would like to thank my dear friend Anna Kalliantasis, who supported me emotionally and encouraged me to never give up during this challenging endeavor. I must admit that there were a couple of times when I doubted that I would succeed in completing the program, but thanks to all the special people mentioned above, I was able to overcome all those worries.

DIGITAL MANIFEST

- I. Capstone project whitepaper (PDF)
- II. Code and other deliverables
 - a. Zip file containing the contents of the GitHub repository at time of deposit
- III. WARC files
 - a. Tableau dashboards, Carto map

A NOTE ON TECHNICAL SPECIFICATIONS

All visualizations included in the two dashboards were created using Tableau 2020 software. One dashboard includes the TEDx dataset as a CSV file. The TWBX (Tableau Packaged Workbook), open Tableau files are archived in a GitHub repo. Additional graphics were created in Photoshop and Illustrator. One chart in my second dashboard (figure 2.5) was achieved using Affinity Designer, a professional graphic design software that has nice functionality for aligning text on curves. I incorporated the Portable Network Graphics (PNG) format image as a layer in Tableau to render tooltips accessible. For stacked bar visualization (figure 2.6), I used a special effect called pointillism. This has a better point view for each city point and allows the user to hover over any point to see individual tooltips with detailed information for each city.

In section 3, I used Carto software to create my geospatial interactive map, which explains hovering tooltip correlations between two large continents, the Americas (North and South America) and Asia. Finally, all visualizations in section 3 and section 4 were developed using R language in RStudio cloud software. All files, images, texts and code files were filed and archived in a GitHub repository at the following link: https://github.com/antonislialis/Capstone_Project
More specifically,

- Microsoft Excel was used to managed data and serve as a local source of downloaded data.
- Tableau Public was the visualization tool used for developing dashboards and storyboards.

The first storyboard has eight charts and one interactive geospatial map:

https://public.tableau.com/profile/antonios3258#!/vizhome/Introduction_TED_story/FINAL

The second storyboard has seven charts and one interactive map:

https://public.tableau.com/profile/antonios3258#!/vizhome/TedTalksStory2_Review1/TedTalksStory23

- The interactive geospatial map shows TEDx correlations between the Americas(North and South America) and Asia developed through CARTO software:

https://antonislialis.github.io/Capstone_Project/ted_map.html

- Section 3 is visualizations through RStudio cloud:

https://antonislialis.github.io/Capstone_Project/Figur%203.2.png

https://antonislialis.github.io/Capstone_Project/Figure%203.3.png

https://antonislialis.github.io/Capstone_Project/Figure%203.4.png

- Section 4 is visualizations through RStudio cloud:

https://antonislialis.github.io/Capstone_Project/Figure-4.1.png

https://antonislialis.github.io/Capstone_Project/Figure%204.2.png

TABLE OF CONTENTS

1. Abstract.....	iv
2. Acknowledgements.....	vi
3. Digital Manifest.....	viii
4. A Note on Technical Specifications.....	ix
5. Narrative.....	1
a. A description of the Capstone Project.....	1
b. Do TEDx Talks have a real impact?.....	2
c. The influence of TEDx events	3
d. My TEDx dataset.....	6
6. Analysis.....	5
a. Storyboard 1	
b. Storyboard 2	
c. Section 3	
d. Section 4	
7. Relationship to Digital Humanities (DH) and previous courses of study.....	17
8. Evaluation.....	22
9. Continuation of the Project.....	23
10. References.....	25

NARRATIVE

A Description of the Capstone Project. TEDx events are astonishingly popular. While attempting to understand how TEDx event presentations became a cultural phenomenon, I discovered some remarkable trends and patterns through data analysis and visualizations. Before discussing these, I need to reiterate that TED is an acronym for “technology, entertainment and design,” but over time the brand has come to encompass many other topics as well.

The first TEDx talks were established in 1984, before the birth of the World Wide Web, when American architect and graphic designer Richard Saul Wurman conceived the idea of combining technology, entertainment, and design in a series of conferences. He chose his main speakers from among the best thinkers in Silicon Valley, Hollywood, and academia. His original vision was to create something that was not the typical dull presentations with Power Point slides and one-hour lectures (Donovan, 2014). In fact, when he lost interest during the conferences, Wurman had no problem sending the speaker off the stage. Six years later, in 1990, TEDx talks were relaunched in California by Wurman and his business partners as invitation-only events and did not use a YouTube channel (Donovan, *How To Deliver a TED Talk: Secrets Of the World's Most Inspiring Presentations*). With this new format, the 18-minute conferences took off. TED talks have been viewed by over one billion people globally and have become a key component of a new global communication landscape (Cadwalladr C., *TED's Chris Anderson: the man who made YouTube cleve*). The audience grew steadily, and because the conferences were easily accessible to anyone who was interested—even at an international level—the perception that TED Talks were created only for an exclusive, privileged, educated audience faded. The most popular talks have received 15-20 million views each and, for many, have become an “addiction” (Donovan, *How To Deliver a TED Talk: Secrets Of the World's Most Inspiring Presentations*). In 2001, Wurman was worn out from running the conferences sold the rights to the company to Sapling Foundation, run by Chris

Anderson (Hochman *No, His Name Is Not Ted* nytimes.com). Anderson maintained the same format of conferences delivered in eighteen-minute chunks, and under his leadership TED Talks expanded with the creation of other platforms such as TED Global (a series of worldwide conferences) and TEDx, where the turnout of multicultural attendees and speakers of any age, gender, or educational background started disseminating TEDx Talks worldwide. In 2006, a year after YouTube emerged, TEDx began posting videos of selected talks on its website. The first online TEDx events had more than one million views. Moreover, the TED website began giving global audiences free access to some of the world's greatest teachers, leaders, practitioners, and thinkers (Anderson and Oberweger, *Thank you for coming to my TED talk: a Teen Guide To Great Public Speaking*). During this process, a variety of alterations had to be made to tailor features such as privacy and security protocols to every host city. After some years of modifications, adjustments, and development, TEDx Talks gave rise to a worldwide community of passionate people, today covering many topics, including innovations, science, business, global issues, and the arts. TEDx Talks welcome people from every walk of life and cultural background who seek a deeper understanding and analysis of contemporary culture.

Today, TEDx Talks' ubiquitous online videos cover virtually any topic conceivable—from politics, feminism, and science to personal development, and anything in between. Nobel Prize winners have presented, as have politicians, academics, celebrities, scientists, and creatives from all walks of life. What began as a small annual conference is now a globally recognized brand responsible for large-scale conferences, podcasts, awards, educational series, and much more. As a nonprofit foundation, the agenda remains: ideas worth spreading (Donovan, *How To Deliver a TED Talk: Secrets Of the World's Most Inspiring Presentations*). TEDx events are not only informative but also a source of inspiration. For example, TEDx events' popularity has surged over the last decade as all the produced videos have been posted for free online and all the featured

talks—especially those with a more personal or emotional storyline—have been shared through social media channels (Roos, *How TED Talks Work*).

Do TEDx Talks have a Real Impact? There is substantial disagreement regarding the real impact of TEDx Talks. Along the years there were many critiques along the years doubting the value of TED Talks real potential. In an op-ed in *The Guardian*, Bratton (2013) posits that “science, philosophy and technology run on the model of American Idol [which] is a recipe for civilizational disaster”. Bratton also wonders “why so little of the future promised in TED talks actually happens? So much potential and enthusiasm, and so little actual change”. He claims also that TED Events actually don’t work and the main reason for that is over-simplification on the thematics presented. In a research that some scientists have published in their journey talking about the characteristics and impacts of TED Talk Presenters arguing that the majority of presenters of the TED Events are non-academics. This signifies that science popularization is only a small part of the function of TED Talks, which includes presentations by technologists, designers and entertainers. It is notable how just only few academics comprise the pool of TED Talk presenters (Sugimoto et al. *Scientists Popularizing Science: Characteristics and Impact of TED Talk Presenters*). According to Evgeny Morozov social change as portrayed in these talks is easy and fun and can be catalyzed by content broken down in a TED-like fashion, especially when such talks “go viral” on the Internet. Consumers of TED talks are thus depicted as agents of “technological solutionism” where short-lived digital activism replaces sustained civic engagement (Morozov, 2013, p.5-9).

After I watched many TEDx presentations, I realized that TED talks has become a useful web platform to spread the ideas through stories of remarkable people. I believe that this emphasis on the personal stories has turned TED talks into an infotainment industry. In addition, nearly all the talks are made available for free to anyone with Internet access (Roos, *How TED Talks Work*). No studies have measured the global impact of a single TEDx event, so it is not possible to gauge how many people each talk reaches individually. It seems though that there are some benefits: for every weeklong conference there are more than sixty presenters who are not being paid for their talks. In addition, nobody is allowed to use TEDx conferences or the platform to sell products (Roos, *How TED Talks Work*). TED's website states "plenty of investors, philanthropists, and entrepreneurs who fund these conferences because they support spreading inspirational ideas". It mentions also "there are examples of unexpected donations during those conferences abound, situations in which audience members were personally touched by these ideas" (Roos, *How TED Talks Work*). However, as most of corporations and individual investors are self-interested wouldn't it be also a thought, that all of those could be profit-driven simultaneously? We had several examples in our history where many humanitarian organizations in the past ended up creating products that impacted negatively on people's lives or violated human rights. Or other cases that were identified forms of corruption that are relevant to investor's investment decisions.(Denolf, *The Journal Of World Investment and Trade*). That said, I'm trying not to undermine TED's services and reliability but mostly to shed light on cases that history has shown us in the past where some "investors and philanthropists" didn't have always generous intentions.

The Influence of TEDx Events. I have always been interested in discovering whether TEDx talks really affect us and whether the motto "ideas worth spreading" can change our world. TED claims that the talks provide people with ideas worth spreading. But who spreads these ideas? As I realized after my research in TED's world, anyone who has an interesting idea and is ready to

perform an inspiring, passionate, and rousing speech can spread their idea. The audience does not need to be intellectual or have an extensive education; personal experience is enough to tell a true story and inspire others. Sometimes this is someone sharing the story of how they accomplished their dreams. For a story to be compelling, though, information alone is never enough. The story needs to be presented in an inspiring and stimulating manner. The difference between TEDx events and many other presentations is the time limit. Being student so many years in schools and universities I noticed that students during lectures are becoming increasingly less engaged while educators are trying harder and harder to meaningfully connect with their students. Some argue that one reason is the forty-five-minute minimum length of classes, which is a long time to hold students' attention (Jason, *Bored Out Of Their Minds*). Conversely, eighteen-minute or even shorter TEDx Talks manage to communicate in a way that grabs the audience's attention, makes successful connections, and inspires meaningful discussions that leave significant impressions on their audiences because they successfully accommodate the average human attention span. Time, therefore, is one of the factors that TEDx events has managed to successfully master; eighteen minutes is enough time for a speaker to disseminate a complex idea and still keep the audience engaged. TEDx Talks' main goal is to plant ideas in people's minds because ideas are among the most powerful forces that shape the world (Banker C., *TED Talks in the Realm of a Changing System*). Wernicke on Bloomberg Businessweek presents a different aspect of the "perfect" TED talk. "The maximum time you are given for a TED talk is 18 minutes. This really forces the speaker to make just one point, and get to it immediately. You don't have any time for diversions. You have to be really brutal about cutting out certain phrases or slides that you think are incredible" (Wernicke, How to Give the Perfect TED Talk).

It is not so much about how much information can be conveyed in a single TEDx Talk, but rather the quality of the ideas and their impact. Chris Anderson's advice (head of TED and British-

American businessman and entrepreneur) is to develop an idea, focus, explain it properly, refer to familiar examples, and make the story vivid with context and language that everybody understands. And this is what a TEDx Talk actually does. It presents the central idea or theme around which information can be understood and organized. In this way, the major ideas become lenses through which the listeners can understand all the information that follows, making knowledge more relevant and meaningful. Finally, the choice of minimal and creative visual communication makes TEDx Talks relatable and easily accessible. Recent studies have argued that the key role of audiovisuals, including animation and other visual cues used during TEDx Talks lectures, along with the independent and engaging language of the speakers, communicates ideas in a way that is accessible, effective, and media-rich (Roos, *How TED Talks Work*). One of the most important factors in the popularity of TEDx Talks is that they are freely accessible online. As of 2018, more than 2600 TEDx Talks sessions were available online and had accrued almost one billion views. This allows anyone, anywhere, to stage a local, independent TEDx event (Stahl, *3 TED Talks to Improve Your Communication Skills*). In addition, all TEDx Talks are educational, eye-opening, and intuitive; and their content range is suited to everybody's profile, serving a range of moods and areas of interest (Bajarin, *Why TED Matters*).

According to the TED website, "today TEDx is not only an organizer of private events, but a global phenomenon with millions of dollars in revenues". The question is if it's appropriate to talk about a "global phenomenon?" I guess this has to be under discussion, as such expressions like that are particularly serious and carry a great weight. What is certain though that one of TEDx's most famous effort is to foster the spread of great ideas. I believe that core of this effort is to provide a platform for visionaries, thinkers, and teachers so that all of TEDx's listeners around the world can develop a better understanding of the biggest issues faced by the world.

TED website also states that "the biggest reason that TEDx matters is the actual impact it

has had on millions of lives over the past eight years since TEDx Talks have been posted for free online” (Bajarin, *Why TED Matters*). Is that though another format of digital way of living?

Meredith Broussard, a software developer and journalist, talking about technology, reminds us in her book called *Artificial Unintelligence* that:

we are so eager to do everything digitally—hiring, driving, paying bills, even choosing romantic partners— that we have stopped demanding that our technology actually work. If we understand the limits of what we can do with technology, we can make better choices about what we should do with it to make the world better for everyone (Broussard M., *Artificial Unintelligence: How Computers Misunderstand the World*).

After I spent a few months listening to lectures, creating visualizations of TEDx Talks data, and extensively researching the TED phenomenon, I have to admit that TEDx has had a significant impact on me personally. It has really challenged my view of the world and prompted me to reconsider how I can make a difference, even outside my field of choice. TEDx Talks afford me the opportunity to connect with the best and brightest thinkers and doers around the world, and the organization’s mission—to make the world a better place by amplifying ideas worth spreading resonates deeply with me. One thing that became clearer recently while watching online lectures and that I had also noticed when I personally attended some TEDx events in my native country, Greece, was that most of the attendees had interesting personalities, were friendly, and were open to networking. I also realized that many of the speakers had the power to make changes in the world and were passionate about working on major issues that concern the whole planet. It is also notable that the audience, no matter their personal backgrounds, inevitably connects with the speakers and locates mutual and meaningful points of reference, especially when speakers demonstrate constructive ways to help people on a personal level.

My TEDx Dataset. Cole Nussbaumer Knaflic in his book called “Storytelling with Data”

gives us ways to go beyond conventional tools to reach the root of our datasets, and use our data to create an engaging, informative, compelling story (Knaffic, *Storytelling with Data: A Data Visualization Guide for Business Professionals*). Following some of his examples, I completed creating my last form of TEDx local events dataset. This project uses a dataset of all TEDx local events available on the TED website. I received this data from my advisor, Professor Lev Manovich. His lab is developing a large-scale data collection, analysis, and visualization project named Elsewhere. For this project, the lab created a number of different datasets describing millions of cultural events worldwide from 2003 to 2018. Prof. Manovich shared one of these datasets with me—the list of TEDx local events. My analysis of this data formed a project separate from the Elsewhere project and simultaneously allowed more insight into global cultural patterns that Prof. Manovich's lab hopes to augment by analyzing other datasets. More precisely my main dataset consists of 24,477 local TEDx local events that happened in 3,583 different cities and 187 countries worldwide. All these TEDx local events took place between 2009 -2018.

The TEDx Talks Capstone Project is a data visualization project dedicated to a quantitative analysis of contemporary culture on a global scale. The project is designed to address basic questions about the experiences of cities and countries worldwide. In addition, through visualizations, it analyzes differences in TEDx activities between the years 2009 and 2018 for two major regions: the Americas (North and South America) and Asia. By employing illustrative charts and graphs, the TEDx project endeavors to show how data can be extracted, compiled, and reorganized to establish an interpretation of what the results will show regarding a chosen city or country that hosts a TEDx Talk.

The methodology of collecting all the data of TEDx events for all the cities between the years 2009 and 2018 is based on collecting detailed information for these events from different global online platforms and other resources. What was done from the team of Cultural analysis lab

was millions of cultural events aggregated in data sheets. There was a plethora of different kind of cultural events. Among those were dates for hundreds of art biennales, fashion weeks, design weeks, thousands of film festivals, education programs in creative fields, local meet up groups and seminars on certain topics, academic conferences, creative clusters, and cultural. All these topics were identified by Cultural analysis lab and were presented by cultural places and events analyzing their diffusion. For example, a conference, a concert, a work art of a museum may host descriptions in its own social media pages as well as in many global and regional services like meetup.com, e-flux.com, culture.ru, behance.com etc.) Cultural analysis lab created those datasets containing those descriptions and then used computational text analysis to identify unique topics, associations between them, geographic concentration and so on. So my goal was to extract TEDx local events and focus on them and their columns. After trial versions of visualizations I have decided to extract TEDx data that were between years 2009-2018. Using pivoting calculations, data cleaning, creating new structures, aggregating, summarizing or grouping multiple variables through different functions I ended up with my final form of datasets. The dates and geographic locations of these events were among the variables that I used to enrich my dataset, achieving a more constructive research pattern and developing my visualization charts and interactive maps in more depth. Apart from the geographic coordinates (i.e., longitude and latitude), the datasets include interesting variables related to TEDx Talks from 2009 to 2018 that I used to analyze and visualize the project: the dates of every TEDx Talk, along with the city, country, and continent (meso and macro regions) in which each occurred; the development level of each country; the GDP (gross domestic product) per capita; the human development index of every country; measurements of the economic complexity index of each country; and finally the population of each country as of 2018. Additional variables developed during our analysis were the total number of TEDx Talks per city and the total count of each type of TEDx Talk.

ANALYSIS

Data can be structured or unstructured. Visualizations can be created using full data, aggregated data, or summarized data. In this paper I present four different sections analyzing TEDx local events. The first two are poster narrative stories. The first is a general introduction that reveals basic trends of TED events between 2009 and 2018. The second poster narrative story takes a socioeconomic approach. The third section discusses similarities and differences between the two continents, and the fourth section highlights visualizations related to dates of attendance, weekly and monthly over the aforementioned decade.

Storyboard 1. The first section of this project is a dashboard introduction of TEDx events hosted in all countries between 2009 and 2018. TEDx Talks tend to occur year-round, and the decade's data reveal the numerous correlations among variables and illustrate interesting trends and patterns.

The main chart of this section is a world density map that clearly displays the distribution of TEDx events throughout the world. I created a map using Tableau software (see figure 1.1). I used the attributes of latitude and longitude as well as the attributes of the cities worldwide. The color red displays the highest concentration areas of TEDx events on the ESRI (Environmental Systems Research Institute) map, and the color orange displays the areas of lowest concentration.

The socioeconomic expression of the north-south divide, which refers to the global northern countries being more economically developed and the global southern countries being less so, correlates to TED Talks. The map shows that geographically, the density of TEDx Talks is highest in the Northern Hemisphere, with fewer occurring in the Southern Hemisphere. The interactive version of the map includes tooltips hovering over each location to provide detailed information regarding TED activities.

Then I created a simple bar chart of TEDx activities by continent (see figure 1.2). The

dashboard shows that North America leads with 10,998 TEDx events. Europe and Asia show almost the same figures. Africa follows with fewer TEDx events, and Oceania has the fewest TED Talks with only 541 events.

I was also curious to identify the ten most popular TED cities globally. It turns out (see figure 1.7) that New York City holds first place worldwide. Creating a simple bar chart, I discovered that Asia dominated all continents. Six of the top ten cities were Asian cities (Seoul, Beijing, Singapore, Bengal, Mumbai, and Shanghai), which was why I decided to focus more on Asian countries in the third section of my project.

One of the Indian TEDx events that took place in 2009 and that I watched recently stated that Asia had the capacity to reclaim its place as the world's leading industry on the world market. One of the graphs shows Asia's global economic growth and predicts the exact date that Asia, specifically China and India, will outstrip the US. In third place we find Europe, with mostly Spanish cities such as Madrid and Barcelona among the ten top cities in the world.

The data visualization bubble charts (see figures 1.4 and 1.5) use a technique in which a set of numeric quantities is represented by closely packed circles whose areas are proportional to the quantities. It displays circles packed as tightly as possible to make efficient use of space. For my needs, I used two bubble charts to display three dimensions of data. Figure 1.4 visualizes which cities hosted the most TEDx events between 2009 and 2018 worldwide. The interesting pattern here is that the top cities—New York, London, and Seoul—are distinguished as the top cities on their respective continents. Thus, the top three continents (North America, Europe, and Asia) in the world each have one top TED city. New York City is strongly in the lead, and London and Seoul are second and third.

Using the same color code as in the previous charts for my second bubble chart (see figure 1.4), which indicates the region (continent), I showed all the cities in the world that had hosted

TEDx events during that decade. Each bubble, depending on the number of TEDx activities, represents a group of cities per continent. This method more clearly shows the relationships among all the bubbles (circles) on the chart through positioning and differing proportions. Because the data points here are so numerous (global TEDx cities exceed 24,000 data points), in the interactive dashboard I used hovering mouse tooltips to provide viewers with additional information for each city to help them remain engaged longer and make correlations among cities and continents. One can see clearly which city dominates in every region.

Observing a trend, I next traced the activity of each of the ten top global cities over a ten-year period. Here a line chart (see figure 1.6) was the ideal type of graph to represent TED data's continuous time span. Data values are plotted as points connected using line segments. Each line segment represents one city. What I wanted to demonstrate here was how TED events varied within those ten years, 2009–2018. All ten top cities showed large growth, but New York City appeared to show the highest growth reaching 449 TEDx events in October 2018. What is interesting is the rapid increase of events in New York, where it started with just 3 TEDx events in 2009 and reached 448 within a decade. London and Seoul also showed an upward monthly trend accordingly; their maximum participation in TEDx activities up to 2019 was 285 and 245 events, respectively. Overall, we can see a clear upward trend in the numbers in all cities although some of the Asian cities, such as Beijing, Singapore, and Bengaluru, appeared to level off between February and December 2016. In the chart's interactive version, the viewer is able to see line segments either changing the x axis per time, quarters, weeks, months, or years. As the user switches modes to the x axis, different and more precise correlations and insights are revealed.

Moving forward, I wanted to display in a chart how the countries with large TEDx activities can prevail, presenting a quantitative value (see figure 1.5). In this case a tree map could clearly highlight the composition of a large rectangle divided into smaller rectangles. I also found it more

effective to label the rectangles with percentages, especially the most prominent values. Clearly, the United States has by far the country the highest percentage of events (30.93% of total TED events). European countries ranked second and Asian, third. However, Asian countries prevail because there are more divided rectangles than for any other continent.

Pie charts are designed to show how a whole is divided into various parts. I found it interesting to determine whether the urban population of each city with TEDx activities had any impact on how TEDx events occur. I used only the “population” value from my dataset and divided the whole circular graph into five segments proportionally (see figure 1.8). The most interesting observation was that the global distribution of TED events occurred mostly in global cities in which the population was fewer than one million people. This segment comprises 54% of the growth compared with the rest of the slices of the pie chart. This result contrasts sharply with previous insights, in which large metropolitan cities with high-density populations (e.g., New York, London, and Seoul) ranked first. A similar pattern was observed with the second group, 21% for cities whose population distribution ranged between one and five million people. In the third group, which represents 11% of the entire population distribution, the range is unknown because my dataset in that value was unclear.

Finally, it was interesting to discover which year in the decade from 2009 to 2018 had the most fully enriched TEDx events (see figure 1.9). The year 2018 ranked highest for the entire decade with 3,587 TEDx events, and 2017 had 3,568 events. Although as a whole, the decade showed a gradual increase in the number of events occurring, the year 2019 did experience a slight recession.

Storyboard 2. The development level of each country, along with its GDP(Gross Domestic Product), HDI(Human Development Index), and ECI(Economy Complexity Index) , are factors that impact world economic situations and prospects; adjust living standards; and prioritize

sustainable consumption, productive capabilities, technologies, knowledge, ideas, and, of course, global phenomena like TEDx events and conferences (Chen, *Employment Cost Index (ECI) Definition*).

Before analyzing my second storyboard, it would be helpful to refer to the social economic parameters that I used for analysis, and which shaped my visualizations. Some of my graphs were created to display correlations. The number of points in each graph reflects the number of talks in each city worldwide (Beltekian, *How and why should we study 'economic complexity'?*).

As previously said, the variables that I use in this storyboard are GDP, ECI and HDI. The GDP of an economy is a measure of total production. More specifically, it is a monetary total market value of all goods and services produced in a country in a given time period. GDP data are used to identify correlations over time. It actually measures economic activity and serves as a good indicator to track the economic health of a country (FocusEconomics *What is GDP?*). GDP per capita (per person) derives from a straightforward division of total GDP by the population. It indicates economic performance and is a useful unit to make cross-country comparisons of average living standards and economic well-being. When discussing how the TEDx mission is connected to business, investment, technology, and innovation, it makes sense to connect TED's frequency, conduct, and quality to the economy of each country and its GDP (Nguyen *Discovering the Impact of Innovation and Technology on Economic Growth Using Panel Data*).

Another important economic indicator is ECI. This indicator is basically a rank of countries based on how diversified and complex their export baskets are and how capable each country is of producing a wide range of sophisticated products. ECI is a holistic measurement of the productive capabilities of large economic systems, usually cities, regions, or countries. Countries that are able to sustain a diverse range of productive and exceptional know-how are able to produce an extensive variety of goods, including complex products that other, more limited countries cannot

make (*The Atlas of Economic Complexity* by @HarvardGrwthLab). This indicator is watched by investors largely for its inflationary insights. It also calculates total employee costs for businesses, not just wages. Wages represent the lion's share of the total cost for a company to produce a good or deliver a service in the marketplace (Chen, *Employment Cost Index (ECI) Definition*).

Furthermore, the complexity of each country's products is mainly associated with the prediction of a current country's income level. Thus, ECI provides a useful measure of economic development. ECI has been successful at explaining cross-country differences in GDP/capita and economic growth. When applied to country-export data, ECI represents a ranking of countries that places countries with similar exports close together in the ordering (Mealy, *A New Interpretation of the Economic Complexity Index*. SSRN Electronic Journal).

I began with two creative visualizations showing the traffic of TEDx events during the years 2009–2018, first as a cumulative acquisition horizontally (see figure 2.1) and then as a daily acquisition of events displayed vertically (see figure 2.2). Both represented the most active days on which TEDx events occurred. The highest TEDx activity day was April 5, 2010, when 7.623 TEDx events were conducted throughout the world. In the interactive version of the story, the user can clearly identify countries that participated that day in addition to the percentage of their involvement.

Next I tried to identify correlations between GDP/capita and ECI using those two variables in my axis. The dot chart (see figure 2.3) implies different observations. The results cover all countries around the world that participated in local TED events during 2009–2018. GDP per capita displays the economic output per country—that is, the income range per USD (United State Dollars). The other axis indicates the ECI ranking, which implies that the lower values have more complexity. Moreover, each dot demonstrates that in each country both values are progressing. The higher GDP per capita is the higher ECI rate display.

The next indicator I wanted to emphasize and connect with TEDx local events is the HDI, which was created to emphasize that expanding human choices should be the ultimate criterion for assessing development results. Economic growth is a means to that purpose, but is not an end in itself. The HDI can be used to question national policy choices, asking how countries with the same level of GDP per capita can end up with different human development outcomes (Jason, *Bored Out of Their Minds*).

The HDI is a summary measure of average achievement in three important key dimensions of human development. The first is a long and healthy life, which is measured by life expectancy. The second is access to education and how knowledgeable a nation's population is, measured by expected years of schooling, school entry age, and the mean of years of schooling of the adult population. The third key dimension is a decent standard of living, which is measured by gross national income (GNI) per capita adjusted for the price level of the country. The HDI is the geometric mean of normalized indices for each of the three dimensions (*Human Development Reports*). I developed a line chart (see figure 2.4) using only countries that participated in TEDx events from 2009–2018. The correlation of TEDx events and the HDI index is that continents such as Asia present a lower level of HDI than Europe and the Americas, although the number of TEDx events in Asia ranks high. The same thing occurs when we compare the HDI measures in Africa to Oceania and the number of events taking place on each continent. The reason for that is that on those continents, especially Asia, where they seek ways to improve life quality and education, TEDx events are vital for the audience and the participants to exchange ideas, learn, and take advantage of innovation to improve aspects of their lives that will eventually elevate the key dimensions of human development.

For my dashboard story, I created an artistic pie chart showing the activity of TEDx events by continent (see figure 2.5). Each color represents a different continent. Each circle signifies a

TEDx event that was conducted during that decade (2009–2018) on each continent. To delineate the continents more clearly, I placed a small pie chart in the center of the circle and added colorful labels on a circular path around the edge. The circles were sized and positioned farther away from the center of the circle based on the number of TEDx events. For example, exploring the interactive dashboard version, one can note that the cities located near the center of the circle show a limited number of events whereas cities far away from the center of the circle saw a large number of TEDx events. The Americas warranted an extra circle at the end of the visualization because cities such as New York appear to have a greatly increasing number of events, unlike Toronto and São Paulo, which ranked second after New York.

My next step was to create an interesting and artistic stacked bar chart (see figure 2.6). One challenging aspect of this chart was implementing a technique called pointillism, inspired by one of Tableau’s tutorials (Flerlage, *Pointillism in Tableau*). It’s about a technique or practice of applying small strokes or dots of color to a surface so that from a distance they visually blend together. I was unable to depict perfect pointillist art, although the final result was relatively successful. This technique allows the user to hover over any point to see the TED event’s name in every city in the world. Using the variable from my dataset “meso-region,” which addresses a medium-sized region between the size of a city or district and the size of a nation, I managed to categorize the cities in twelve different geographic meso-regions. The user is able to see the total number of labeled events and a color legend of each geographic area.

After the visualizations showing perspectives of continents and cities, it seemed sensible to display a thematic map (see figure 2.7) showing shading patterns of countries that hosted TEDx events globally. Because the chorochromatic technique effectively utilizes data to easily represent symbols or predetermined areas (e.g., countries or cities), I made a choropleth map, which is a thematic map in which areas are shaded in proportion to the measurement of the statistical variable

being displayed on the map. On that map I used the same color coding as the other charts in my storyboard. All countries were displayed proportionally shaded, and the user can see differences between areas depending on TEDx event density across a displayed country. Inside the tool tip I developed an extra bar chart that highlights a large amount of information and depicts the result more effectively. Although tool tips are an excellent way to depict more meaningful evidence on a chart, I decided that using a small bar chart for every tooltip would lead to clearer and more comprehensive results. Thus, the tooltip for each country plainly shows the numbers for each city. The bar chart provides a display of each city that visually measures the number of events, showing which city ranks first and including the percentage of total TEDx events per country.

The last thing I did was to make a more functional visualization using the development level of each country (see figure 2.8). The differences between individuals and populations in terms of their wealth, assets, and income are the parameters that indicated economic inequality. Although we often notice differences in economic levels within countries, economic inequality can be applied on a larger scale to the nations of the world. The first economic category, developed countries, comprises countries that are more industrialized and have higher per capita income levels. Developed countries are characterized by their use of resources; their populations consume nearly 88% of the world's resources. The second category is developing countries, which have lower incomes per capita. These can be divided into moderately developed and less-developed countries (study.com *Economic Inequality: Differences in Developed and Developing Nations*).

The third category is transitioning economies, which are changing from centrally planned economies to market economies. Characteristics of these economies include economic liberalization, where prices are set by market forces rather than by a central planning organization. Using all countries that hosted TEDx events, I created bar charts to highlight the current level of development of these countries and the percentage of participation of each category of TEDx

activities. The results are impressive. Although developed economies lead in TED activities, developing countries participate dynamically in TEDx's initiatives. In fact, the total number of developing countries proportionally exceeds developed countries, especially by the end of the decade. Transitioning economies represented a small portion of TEDx events globally, but developed and developing nations clearly predominate.

Section 3. My third section differs from the first two in that charts and maps are displayed individually. The visualizations are related to correlations between two continents: the Americas (North and South America) and Asia. I identified demographic trends and patterns to explore those two regions. There are many differences in the cultural, social, economic lives of these two regions as well as the political and religious sectors. Despite their differences, there is a long history of exchange between Asia and the Americas dating back to the sixteenth century and including the nineteenth-century large-scale migrations of Asian laborers and traders to the United States, Latin America, and the Caribbean. Today, China is among the top three trading partners of most countries on the continent and is increasing its socioeconomic presence rapidly. India, Korea, Japan, Taiwan, and other Asian countries are following closely behind. As a result, trade, investment, technology, design, development forums, and cross-cultural exchange are shaping the Americas and Asia with common economic and social realities. Regional policymakers and business people look across the Pacific with a blend of intrigue, competitive anxiety, and awareness in learning from Asia's social and economic success (Lee, *The making of Asian America: a history*). In terms of TEDx events, the two regions are moving parallel to each other. The Americas and Asia are hosting TEDx events, but each emphasizes different topics.

The interactive geographic map (see figure 3.1) I created using Carto software visualizes my dataset to make spatially-aware decisions regarding those three continents. It provides an intuitive and efficient way to inform users of key data points relating to cities from Asia and the

Americas that hosted TEDx events between 2009 and 2018. Using this platform, the user can easily see correlations among countries based on colored shaded density information that represents a range of values that are identified in the legend. In addition, I created a hovering tooltip for each city that displays a total number of TEDx events over that decade.

Moving forward, I created a line graph (see figure 3.2) to clearly display changes between Americas (North and South America) and Asia over time on one axis and the quantity of TEDx events on another. The graph indicates a strong relationship between those two sets of values. Although the Americas reached a higher rank, with more than 1.500 TEDx events in 2016, Asia followed proportionally, particularly after 2014. In 2018 there were more than 1.000 TED events in Asia, the highest score of all the years. By contrast, the United States showed a slight decline in TED activities, which approached Asia's TED events score over the next years.

The next challenge (see figure 3.3) was to focus on the top cities in North America and Asia that hosted TEDx events and try to determine whether the most important TEDx topics were taking place in each city and come up with an average number of events. Using statistics on TED's official website (TED.com), I concluded that the most prevalent types of events worldwide were in technology, business, design, global issues, and science. American cities hosted all the major TEDx topics. New York ranked highest in all topics, and Los Angeles followed. The interesting thing about Asian cities is that all of them hosted a large variety of types of events, but their total number of events was much lower than that of Northern and Southern American cities. It seems also that Asia focuses more on other types of TEDx events that are not as prominent in American cities. My last challenge in that section was to make to synthesis of line charts of the top ranked cities in the continents of North and South America and in Asia (see figure 3.4). In this chart it is obvious what traffic of TEDx activities each city has and what progress has been made in hosting local TEDx events between years 2009-2018.

Section 4. Is there a particularly popular month or day of the week for TEDx? To answer this question, I focused on the variable of my datasets called “dates of TEDx events.” During my research I have discovered that among the nine reasons that TEDx’s events are so popular is the timing of events. Therefore, I created calendar heat maps (see figure 4.1) using R language to explore “daily values” or “day of the week” to determine whether that would give us a good summary of the distribution of TEDx events. The heat map calendar shows that the distribution of days is a bell curve with Saturday and Wednesday being the most popular days and Sunday being the least popular. My assumption had been that most TED conferences would occur sometime over the weekend. This distribution was true for all ten years although TED activities have gradually increased in more recent years. There was a sharp increase in TEDx events in 2018; in the same year one can barely find dates with no TEDx activity. In addition, the number of events has been relatively constant since 2009.

The next challenge was to determine the most popular months for TEDx traffic over the ten-year period (see figure 4.2). The results indicated that events occur throughout the year. The most popular months for TEDx conferences for all continents were March, May, October, and November. Global event planning shows similar trends. Usually there are three times of the year when event and conference planning displays distinct upward trends: in the spring (April and May), early fall (September and October), and mid-winter (January and February). TEDx activities coincide with global event planning. Furthermore, although Europe and Africa have steady traffic all year, Asia and the Americas reveal a disproportionate but much higher level of TEDx activity all year. Thus, TEDx events in Asia and the Americas have a greater global share than any other continents worldwide. The final observation for that chart is that TEDx events traffic skyrocketed during the last years of the decade, primarily 2016, 2017, and 2018.

Relationship To Digital Humanities And Previous Courses Of Study

TEDx initiative is well connected with its terminology as digital humanities (DH). DH is the use of digital media and technology to advance the full range of thought and practice in the humanities, create scholarly resources to research those resources, and communicate results to colleagues, practitioners, and anyone who would be interested (Terman, *Curating or Censoring? The TED Controversy and Digital Humanities*). There is a close connection between DH and what the TED initiative actually does. Both preserve open speech on the web, and both educate and provide knowledge to the public. TEDx Talks and DH projects are moving further and further into user-generated content where the users, students and other interested individuals, join conversations in a decentralized process of knowledge creation. In the maze of data, how do we form knowledge? In the wilderness of facts, how can we obtain wisdom? In addition to TEDx events in which answers can be found through thousands of online lectures, DH projects are in a vital position to approach these questions as well. It is well known that DH projects are taking the lead in applying computer-based technology to the humanities, focusing on developing digital tools, media distribution, social media, and other materials. TED events are being conducted in a similar digital way.

DH incorporate key insights from languages, literature, history, music, media communications, computer science, and information studies and combine these different approaches into new frameworks. Furthermore, DH projects have developed new methods and techniques to access archives and collections such as statistical analysis, topic modelling, or data analysis visualization. The purpose of those techniques is to enable ambitious projects to be created with large interdisciplinary teams that are brought together to work on complex projects (Dobson, *Critical Digital Humanities: The search for a methodology*). What the discipline has achieved so far is to transform a great concept or idea of what a humanities research project can be, giving the

public excellent ways of experiencing past and present cultures, all available on the web. These digital technologies open up exciting opportunities for connecting the humanities to a wider public culture.

For the purpose of this project, I have decided to focus on a data analysis and visualization proposal for TEDx events worldwide during the decade between 2009 and 2018. The focus is on understanding why TEDx events are more successful in some geographical areas than in others. It includes interesting variables related to TEDx and the cities that have hosted TEDx events during this time period. The project reveals various trends and patterns and visualizes interesting similarities or differences among those variables that are relevant to the cities over these years. I'm very optimistic that this projects will be a useful digital humanities tool for all researchers and practitioners to start using for their own projects. Hopefully, it will reveal the breadth of power that other DH projects offer and might help us better understand critical interventions and policy insights. The TEDx event project, through data analysis and data visualizations, communicates humanistic values and their contribution to public culture and public education. In addition, most of the TEDx topics have humanistic perspectives and aim for a greater diffusion of knowledge, critical thinking, exploring new ways of being in a digital age, and suggesting ways in which the humanities can be enriched. Another intent of this TEDx events project is to analyze, measure, and visualize the growth and diffusion of selected aspects of contemporary culture around TEDx events globally. The project explores and navigates various cities that have participated in those conferences and attempts to find correlations, investigate polices for those locations, and reveal potential strategies and conversions for TEDx events.

The completion of my project was made possible by my previous course work during all the semesters of the DH master's program at the Graduate Center CUNY. Two core courses that enriched my technical skills and affected my decision to pursue the TEDx events project were the

Interactive Data Visualization class with Professor Elie Frymire and the Working with Data course with Timothy Shortell. Although the classes were taught remotely due to the pandemic, I had the chance to absorb fundamental knowledge for my Capstone project from both classes. The first course was a D3 framework in which we had the chance to create various interactive visualizations through different types of charts. We were taught different methods of visualization, and I actually used part of my TEDx Talks dataset to create my final exploratory and narrative project. Working with Data was also exceptionally helpful because I was able to learn how to process multiple datasets; implement practical techniques for acquiring data from various sources; manage, sort, and plot data; and create techniques for advanced statistical analysis through Python code.

Another very helpful resource was the Geospatial Humanities class that I took during the fall of 2019. This course helped me better understand not only how to deepen my knowledge of R language and use more different and complex variables of TED events datasets, but also to cover topics such as spatial statistics, web mapping, geo-processing, and data acquisition.

Moreover, the Digital Research Python Boot Camp, offered through the Graduate Center's M.S. Program in Data Analysis and Visualization and instructed by Andi Cuppalari, was a huge opportunity for me to develop digital research skills and connect with like-minded colleagues in an interdisciplinary environment. The python boot camp also helped me focus on TEDx Talks plots, trying to resolve my own research and statistic issues.

Since the early stages of the project, I have taken a series of weekly workshops at Columbia University directed by Alex Gil. These workshops focused on an extensive workflow minimal computing website. They taught me fundamental principles and gave me the inspiration to browse and exhibit my visualizations accompanied by an explicit narrative and arguments. Because this particular method of exhibiting static minimal computing sites is largely transferable to other digital projects and can be incorporated into a larger platform such as the Elsewhere project, I

determined that it would be extremely helpful to consider later on. Finally, the Master's Thesis and Capstone Project Group in GC facilitated by Dr. Inez Strama was a useful resource; the support group of master's students working on their theses and Capstone projects helped me learn practical strategies to navigate the process.

EVALUATION

As stated in my prospectus, my original idea was to construct a website around my visualizations. As things progressed and after a long conversation with my advisor, it seemed a better idea to present my project as visualization stories instead of a WordPress website. We determined that this would be more efficient, creative, and interactive for the user. Poster storyboards are much more powerful, communicative, and visually stimulating, allowing people to digest the concept much easier as opposed to websites, which are more static and commercial. My advisor also suggested that because I have a design background, I could use these skills to create something more resourceful. One of the greatest setbacks I faced, along with the rest of the world, was the sudden changes in our lives because of the pandemic. I had plans to physically visit many resources such as libraries, museums, and other places that would help me get information and gain insight for my project; unfortunately, all this was not possible with everything closed down. Although I did have online access to my campus library, that seemed insufficient; when I could physically access the library, I felt I had many more options to choose from. Another major setback was that I had planned to start interviewing people who worked for TEDx Events here in New York. Although I did manage to interview them through online sources, I believe that I could have gathered more information if I had had the chance to conduct face-to-face interviews. A success of this project was that I was able to go deeper and find a lot of interesting insights about what is happening with the phenomenon called TED around the world. The results that I found are sufficient for the viewer to develop a deep understanding of what is going on with TEDx events

worldwide. For example, a user can see which of the countries hosting TEDx events have been the most successful or how economic and social parameters can influence the subjects of the talks or the number of views on their website. The technology tools and software I used to make all these visualizations successful and using these tools in combination of these tools were my proudest achievements.

CONTINUATION OF THE PROJECT

I definitely plan to continue working on the TEDx events project after it has been submitted for the completion of my master's degree. It is something that really interests me and has broadened my horizons both personally and professionally. It is a subject with so much potential that one can never get tired of exploring it and learning new facts. TEDx events are a success story, with many fields to explore and investigate, leading to motivating findings. The comparisons that can be drawn are endless. Continuing this project, I would like to focus on the DH aspect of my degree because my main goal was to connect my Capstone project with digital technologies and the disciplines of the humanities. This will give me the opportunity to become more involved with people in this field and collect feedback from them. Once I have gathered all my input information, I will be able to evaluate the project as a whole and reach a better conclusion.

In addition, I am honored that my project will be considered as a small part of a big separate project directed by my advisor called Elsewhere. My project uses a dataset of all local TEDx events available on the TED website. I have received this data from my advisor, Prof. Lev Manovich. His lab is developing Elsewhere, a large-scale data collection, analysis, and visualization project. For this project, the lab created a number of different datasets describing millions of cultural events worldwide from 2003 to 2018. Prof. Manovich has shared one of these datasets with me—the list of TEDx local events. My analysis of this data and publication will form a project separate from Elsewhere—and at the same time will allow more insights into global

cultural patterns that Prof. Manovich's lab hopes to find by analyzing other datasets.

REFERENCES

Anderson, Chris, and Lorin Oberweger. *Thank You for Coming to My TED Talk: a Teen Guide to Great Public Speaking*. Houghton Mifflin Harcourt, 2020.

“The Atlas of Economic Complexity by @HarvardGrwthLab.” *The Atlas of Economic Complexity*, atlas.cid.harvard.edu/glossary.

Banker, C. *Education: TED Talks in the Realm of a Changing System*. Capstone paper presented at Rollins College, Winter Park, 2013.

Bajarin, Tim. “Why TED Matters.” *Time*, Time, 2014, time.com/34784/why-ted-matters.

Beltekian, Esteban Ortiz-Ospina and Diana. “How and Why Should We Study 'Economic Complexity'?” *Our World in Data*, ourworldindata.org/how-and-why-econ-complexity.

Broussard, Meredith. *Artificial Unintelligence: How Computers Misunderstand the World*. The MIT Press, 2019.

Cadwalladr, Carole. *TED's Chris Anderson: the man who made YouTube clever*. The Observer, 2011. Retrieved from <http://www.guardian.co.uk/technology/2011/jul/17/tedchris-anderson-youtube-clever>

Chen, James. “Employment Cost Index (ECI) Definition.” *Investopedia*, Investopedia, 2020. www.investopedia.com/terms/e/eci.asp.

Dobson, James E. *Critical Digital Humanities: The Search for a Methodology*. University of Illinois Press, 2019.

- Donovan, Jeremy. *How to Deliver a TED Talk: Secrets of the World's Most Inspiring Presentations*. McGraw-Hill Education, 2014.
- Denolf, Bert. *The Impact of Corruption in Foreign Direct Investment: The journal of World Investment & Trade*, 2018 <https://doi.org/10.1163/221190008X00016>
- “Economic Inequality: Differences in Developed and Developing Nations.” *Study.com*, 2017, study.com/academy/lesson/economic-inequality-differences-in-developed-and-developing-nations.html.
- Flerlage, Ken. “Pointillism in Tableau.” *The Flerlage Twins: Analytics, Data Visualization, and Tableau*, www.flerlagetwins.com/2018/05/pointillism.html.
- FocusEconomics. “What Is GDP?” *FocusEconomics | Economic Forecasts from the World's Leading Economists*, 2014, <http://www.focus-economics.com/economic-indicator/gdp>.
- Hochman, David. “No, His Name Is Not Ted.” *The New York Times*, 2014, www.nytimes.com/2014/03/09/fashion/Chris-Anderson-Curator-of-TED-Talks-Builds-his-Brand.html.
- “Human Development Reports.” *What Does the Human Development Index Tell Us? | Human Development Reports*, hdr.undp.org/en/content/what-does-human-development-index-tell-us.
- Knaflig, Cole Nussbaumer. *Storytelling with Data: A Data Visualization Guide for Business Professionals*. Wiley, 2015.
- Lee, Erika. *The Making of Asian America: a History*. Simon and Schuster Paperbacks, 2016.

Manovich, Lev. *100 Billion Data Rows Per Second: Media Analytics in the Early 21st Century*, City University of New York, Cultural Analytics Lab, 2018.

Mealy, Penny & Farmer, J. & Teytelboym, Alexander. *A New Interpretation of the Economic Complexity Index*, 2018 SSRN Electronic Journal. 10.2139/ssrn.3075591.

Morozov, Evgeny, *To Save Everything, Click Here: The Folly of Technological Solutionism*. New York, NY: Public Affairs, 2013

Nguyen, Nam. “*Discovering the Impact of Innovation and Technology on Economic Growth Using Panel Data.*” *Medium*, Towards Data Science, 2018, towardsdatascience.com/discovering-the-impact-of-innovation-and-technology-on-economic-growth-using-panel-data-de47568edfbf.

Roos, Dave. “How TED Talks Work.” *HowStuffWorks*, HowStuffWorks, 2015, people.howstuffworks.com/ted-talks1.htm.

Stahl, Ashley. “*3 TED Talks To Improve Your Communication Skills.*” *Forbes*, Forbes Magazine, 2018, www.forbes.com/sites/ashleystahl/2018/04/30/3-tedtalks-to-improve-your-communication-skills/.

Sugimoto, Cassidy R., et al. “*Scientists Popularizing Science: Characteristics and Impact of TED Talk Presenters.*”, 2013 *PLOS ONE*, Public Library of Science, <https://doi.org/10.1371/journal.pone.0062403>

TED.COM. “*History of TED.*” *TED*, History of TED, 2015, www.ted.com/about/our-organization/history-of-ted.

Terman, Rochelle, *Curating or Censoring? The TED Controversy and Digital Humanities* |
Townsend Center for the Humanities, townsendcenter.berkeley.edu/blog/curating-or-censoring-ted-controversy-and-digital-humanities.

Wernicke, Sebastian. "How to Give the Perfect TED Talk." Bloomberg, 2011, www.bloomberg.com/news/articles/2011-09-22/how-to-give-the-perfect-ted-talk.